

## Global Warming Continues

The 2001 meteorological year (December-November) had the second warmest global surface temperature (Fig. 1a) in more than a century of instrumental data (1). Calendar year 2001 will also be the second warmest year on record, as the 11-month temperature anomaly exceeds that in the next warmest years (1990 and 1995) by almost 0.1°C. Our analysis uses recently documented procedures for data over land (1) and for sea surface temperatures (2).

The global warmth in 2001 is particularly meaningful, because it occurs at a phase of the Southern Oscillation in which the tropical Pacific Ocean is cool (Fig. 1b). The record warmth of 1998, in contrast, was bolstered by a strong El Nino that raised global temperature 0.2°C above the trend line (Fig. 1a).

Global surface air warming in the past 25 years is now about 0.5°C, and in the past century it is about 0.75°C (1). The recent surface warming contrasts with warming of only about 0.1°C in the troposphere over the past 22 years (3). However, surface and tropospheric warmings are similar over the past 50 years (4).

The greatest warm anomalies in 2001 were in Alaska-Canada, in a band from North Africa to Central Asia, and the Antarctic peninsula (Palmer Land). The Indian and Western Pacific Oceans were unusually warm, continuing a trend of recent decades (1).

The North Atlantic Ocean is notably warmer than the 1951-1980 climatology. Unusually cool conditions of recent decades, that had been centered in Baffin Bay and extended south and southeast of Greenland (1), have given way to warm anomalies in the past five years.

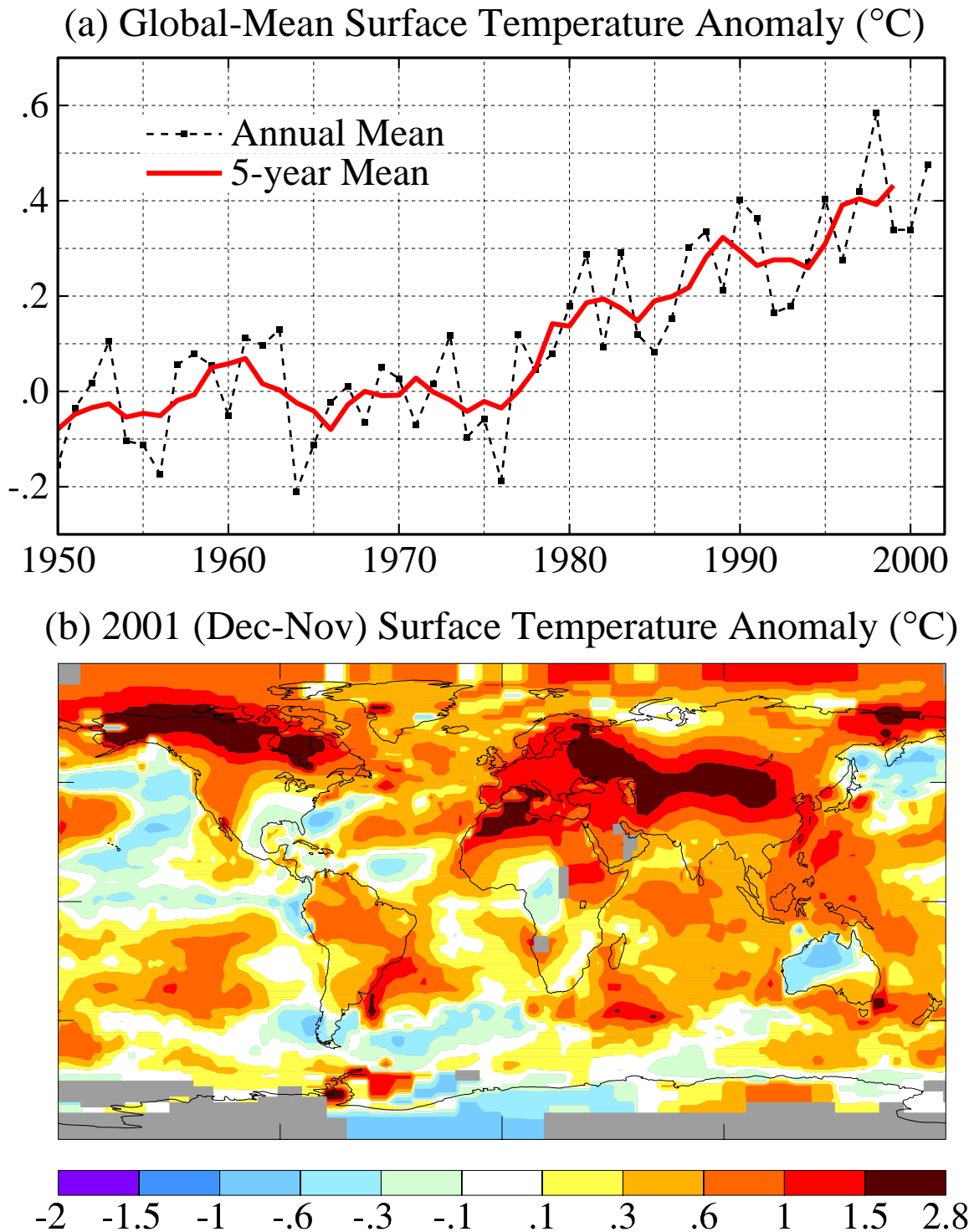
Overall, the 2001 temperature extends the unusual global warming of recent decades. This warming is believed to be a consequence of anthropogenic greenhouse gases (5), and thus the high 2001 temperature can be expected to invigorate discussions about how to slow global warming.

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### References and Notes

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**Figure 1.** (a) Global annual surface temperature relative to 1951-1980 mean based on surface air measurements at meteorological stations and satellite measurements of sea surface temperature, and (b) temperature anomaly for Dec. 2000-Nov. 2001.